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14. ABSTRACT Quantify cavitation conditions within the cerebrospinal fluid (CSF) and develop 'pressure-deformation-injury' maps for brain slices.					
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Report Title

Quad: Cavitation-Induced Structural and Neural Damage in Live Brain Tissue Slices

ABSTRACT

Quantify caviation conditions within the cerebrospinal fluid (CSF) and develop 'pressure-deformation-injury' maps for brain slices.

Cavitation-Induced Structural and Neural Damage in Live Brain Tissue Slices: Relevance to TBI

Ghatu Subhash, University of Florida, 36 mo. (+12 mo. NCE), FY10-FY14, ARO Core Program, \$392K

Objective: Quantify cavitation conditions within the cerebrospinal fluid (CSF) and develop 'pressure-deformation-injury' maps for brain slices.

Scientific Challenges: 1. Pathogenesis of b-TBI following blast exposure is not well understood.
2. Neuroimaging techniques for detection of cavitation induced injury do not exist.
3. Experimental platforms to visualize and resolve real-time incidence of cavitation and tissue deformation following blast exposure are unavailable.

Major Accomplishments:

1. Establishment and characterization of controlled single bubble cavitation following blast exposure.
2. Spatial mapping of deformation and strain on tissue surrogates following cavitation.
3. Identification of temporal progression of neural and astrocyte pathology following blast exposure.

Personnel: 2 faculty, 1 research scientist, and 3 graduate students (2 graduated and 1 in progress).

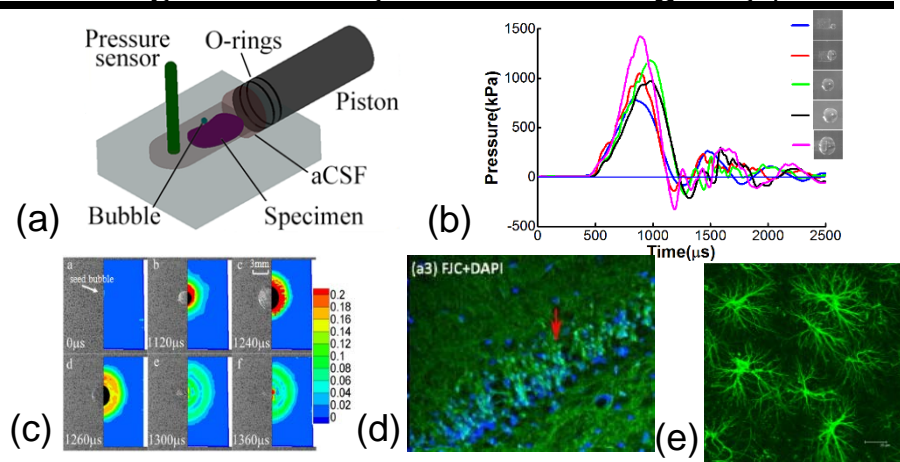


Fig.1. Test cell for generating cavitation in CSF, (b) typical pressure pulse and maximum bubble size, (c) Strain in a gel slice during cavitation, revealing large strain after bubble collapse, (d) degenerating neurons (green) and total cells (blue) in Hippocampus and (e) astrocyte degeneration following shock.

Army Relevance: Identification of injury mechanisms may result in novel mitigation strategies, e.g. protective gear or improved drug therapies specific to this injury.

Funding profile: FY10 \$64K; FY11 \$130K; FY12 \$134K; FY13 \$ 64K

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